

REMARKS/ARGUMENTS

Claims 1-11 and 24 are active.

Claim 24 is amended to correct a typographical error. Thus, the rejection under 35 USC 112, second paragraph is no longer applicable.

No new matter is added.

Applicants disagree with the underlying presumption in the rejection under 35 USC 103(a) combining Okamoto with Muller and Pan (and others) because the combination of art does not provide any suggestion for the claimed fuel components in the ratios defined in a fuel cell also including a reformer and indeed provide no indication as to how DME contributes to the reforming reaction in the fuel cell. That the art does not provide the requisite disclosure that would lead one to the claimed invention, the claims cannot be considered obvious. However, presuming that the Office sticks to the rationale alleged in the rejections, there is nothing in what has been cited in the rejection that minimizes or contradicts the Applicants surprising findings for the claimed fuel, in the claimed mixing ratio, in the type of fuel cell being claimed.

Thus, the claims would not have been obvious as the combination defined in the claims yields more than “a predictable result.” (see *KSR Intern. Co. v. Teleflex, Inc.*, 127 S.Ct. 1727 (2007)).

As already acknowledged in the rejection, Okamoto does not describe a fuel comprising dimethyl ether, water, and 5-10 wt% of methanol, the mixing ratio of dimethyl ether and water is in a range of 1: 3 to 1: 4. For DME, Muller et al is cited. Muller et al. describes a fuel cell using a fuel that includes dimethyl ether, water, and methanol. Pan is cited for the proposition of including less than 10% methanol. Further it is admitted on page

5 of the Action that even the combined art does not describe the mixing ratio of DME and water as defined in the claims (it is apparent that Muller et al. discuss different concentration of fuels (see, e.g. Figs. 7a and 7b)). This claimed limitation is largely ignored and is alleged that this is merely an optimization of what is taught in the combined teachings of the art.

Applicants respectfully disagree.

First, the type of Muller et al.'s and Pan's fuel cell are completely different from the one defined in the claims, i.e. Muller's fuel cell and Pan's fuel cell are "direct dimethyl ether fuel cell" which do not include a reformer.

As Muller et al. do not teach or suggest the reformer, one of ordinary skill in the art would not recognize how DME contributes to the reforming reaction in the Applicant's reformer and therefore Muller does not provide any of the requisite teachings that would lead one to (A) include DME in the type of fuel cell claimed; nor (B) adjust the mixing ratio of DME and water because the mechanism of steam reforming of higher hydrocarbons (such as DME) is more complex.

What about Pan which is cited for the amount of methanol and to optimize fuel compositions depending on use (see page 4 of the Action, last paragraph)?

As already noted, Pan's fuel cell is different than that which is claimed and therefore what is applicable in Pan's fuel cell is not necessarily so for other fuel cells, like that in Okamoto or that in the claims.

Moreover, Pan et al.'s fuel cell type is completely different from Applicant's fuel cell type. Pan et al. merely disclose a type of "direct fuel cell" which does not include a "reformer".

According to the present invention, DME and water are not separated into two phases in the claimed tank, and a desirable stoichiometric composition of fuel can be obtained. As the fuel in the claimed fuel cell is not separated into two phases in the tank, the fuel with the

defined stoichiometric composition is stably supplied to the vaporizer, reformer, and CO gas removal apparatus, and fuel cell unit. Thus, the electricity is stably generated in the applicant's fuel cell system. That this could be achieved is considered by the inventors to not have been expected based on what was known.

What is defined in Claim 1 is not the discovery of optimum working conditions for the fuel cell as alleged in the rejection. Rather, the fuel ratio (claimed fuel comprising dimethyl ether, water, and 5-10 wt% of methanol, the mixing ratio of dimethyl ether and water is in a range of 1: 3 to 1: 4) is one of the important features for the present invention to achieve stably generated electricity.

As Okamoto, Muller et al. and Pan et al. fail to disclose or suggest the fuel cell defined in Claim 1 and the unexpected advantages obtained thereby, the claims would not have been obvious in view of these citations. Withdrawal of the rejection is requested.

The rejections of Claims 28 under 35 USC 103(a) in view of Okamoto, Muller et al., Pan et al and Zhang are no longer applicable as Claims 28 and 29 are cancelled.

The rejections of Claims 7, 8, 30 and 31 under 35 USC 103(a) in view of Okamoto, Muller, and Yonestu; based on the combination of Okamoto, Muller, and Suzki for Claims 9 and 32; or Okamoto, Muller and Kaneko for Claims 10 and 33 are also not applicable to the claims. Claims 30-33 are cancelled. While Claims 7-10 remain pending, these rejection differs from the Okamoto, Muller, and Pan rejection primarily for the reliance on (A) Yonetsu for the particular features of the fuel tank defined in claims 7 and 8; (B) the added features in Claim 9; and (C) reforming catalyst from Kaneko.

However, for the reasons similar to those detailed above, this combination of art does not provide any suggestion for the claimed fuel components in the ratios defined in a fuel cell


also including a reformer and indeed provide no indication as to how DME contributes to the reforming reaction in the fuel cell. That the art does not provide the requisite disclosure that would lead one to the claimed invention, the claims cannot be considered obvious. Further, there is nothing in what has been cited in the rejection that minimizes or contradicts the Applicants surprising findings for the claimed fuel, in the claimed mixing ratio, in the type of fuel cell being claimed.

Withdrawal of these rejection is requested.

A Notice of Allowance for all pending claims is requested.

Respectfully submitted,

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